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Description

VERTICAL ROTARY PARKING SYSTEM

BACKGROUND OF INVENTION

[0001] This application claims the priority of Korean Patent Application No. 2002-79158, filed on December 12, 2002, in the Korean Intellectual Property Office, the disclosure of which is incorporated herein in its entirety by reference.

[0002] The present invention relates to a vertical rotary parking system which vertically circulates palettes that are fixed to a suspension chain at regular intervals and loaded with vehicles, and more particularly, to an improved vertical rotary parking system which reduces noise generated upon the driving of a suspension chain and has a simple structure.

SUMMARY OF INVENTION

[0003] One object of the present invention is to provide a vertical rotary parking system including a simple driving unit so that the time and costs for assembling the vertical rotary parking system are reduced.

[0004] Another object of the present invention is to provide a vertical rotary parking system which minimizes the occurrence of surgy, so that noise generated due to the driving of the driving unit is greatly reduced.

[0005] To accomplish the above objects of the present invention, there is provided a vertical rotary parking system in which hanger support plates are fixed to a suspension chain circulating along an endless track and support hangers with palettes on which vehicles are loaded, and the hangers are circulated by a driving unit. The driving unit including a frame, a driving motor, chain guide rails, an annular rotating body, a pinion, and a coupling portion. The driving motor is fixed to the frame and generates power. The chain guide rails are supported by the frame and guide the suspension chain. The annular rotating body is supported by a support unit such as to be rotated with respect to the frame, has an inner circumference on which an inscribed gear is formed, and includes at least two pull blocks. The pinion interlocks the inscribed gear and is rotated by the power of the driving motor. The coupling portion is formed on the hanger support plate and combines with the pull blocks so that the pull blocks can slip onto or out of the hanger support plate.

[0006] The support unit includes an annular fixing body which is fixed to the frame and has an inner circumference with which the annular rotating body is rotatably combined.

[0007] Alternatively, the support unit includes a plurality of guide rollers rotatably installed on the frame such as to be arranged in a circle, and an annular rib which is formed on the edge of the inner circumference of the annular rotating body and guided to the guide rollers.

[0008] The coupling unit is constituted with a pair of dogs which are separated from each other by a distance corresponding to the width of each of the pull blocks and protrude from the upper surface of the hanger support plate.

[0009] Alternatively, the coupling unit is constituted with a pair of pull rollers which are rotatably installed on the hanger support plate at a distance corresponding to the width of each of the pull blocks.

[0010] According to these features of the vertical rotary parking system of the present invention, the suspension chain circulates while hanger support plates are being pulled by pull blocks. Thus, noise that can be generated due to the circulation of the suspension chain is greatly reduced, and the vertical rotary parking system is simplified.

Brief Description of Drawings

[0011] The above and other features and advantages of the present invention will become more apparent by describing in detail exemplary embodiments thereof with reference to the attached drawings in which:

[0012] FIG. 1 is a schematic view of a conventional vertical rotary parking system;

[0013] FIG. 2 is a schematic view of another conventional vertical rotary parking system;

[0014] FIG. 3 is a schematic view of a vertical rotary parking system according to a first embodiment of the present invention;

[0015] FIG. 4 is a view of a major portion extracted from FIG. 3;

[0016] FIG. 5 is a schematic side view of FIG. 3;

[0017] FIG. 6 is a view of major portions extracted from FIG. 5;

[0018] FIG. 7 is a schematic perspective view of a driving portion of the vertical rotary parking system of FIG. 3;

[0019] FIG. 8 is a perspective view of the suspension chain adopted in the vertical rotary parking system of FIG. 3;

[0020] FIG. 9 is a cross-section of the suspension chain;

[0021] FIG. 10 is a schematic view for explaining a vertical rotary parking system according to a second embodiment of the present invention;

[0022] FIG. 11 is a cross-section of a major portion extracted from FIG. 10; and

[0023] FIG. 12 is a schematic view for explaining a vertical rotary parking system according to a third embodiment of the present invention.

DETAILED DESCRIPTION

[0024] The present invention will now be described more fully with reference to the accompanying drawings, in which preferred embodiments of the invention are shown.

[0025] In a vertical rotary parking system according to the present invention, hanger support plates are fixed to a suspension chain that circulates along an endless track, at a predetermined interval, and hangers on which vehicles are loaded are supported by the hanger support plates and circulate in a vertical direction. Particularly, vertical rotary parking systems according to preferred embodiments of the present invention to be described later are not based on a technique in which power is transmitted while a suspension chain is interlocking with sprockets, but on a technique in which hangers are circulated while hanger support plates are pulled by a rotating pull block. Thus, noise generated due to driving of a suspension chain is reduced, and the vertical rotary parking systems

have simple driving portions.

[0026] Referring to FIGS. 3 and 4, a pair of guide rails 111 and 112 is fixed to a frame 100 such as to form a vertically long endless track. A suspension chain 130 constituted with a link plate 131 and link pins 132 is coupled between the chain guide rails 111 and 112 so as to be circulated by a driving unit that is described later.

[0027] Hanger support plates 140 are fixed to the suspension chain 130 at a predetermined interval and support hangers 120 having palettes 121 on which vehicles are loaded. Both side portions of each of the hangers 120 are designed such as to be guided to the hanger guide rail 125.

[0028] Referring to FIGS. 4 through 9, in the driving unit for circulating the suspension chain 130, a driving motor 200 for generating power is installed on the frame 100, and an annular rotating body 150 is supported by a supporting unit and rotatably installed on the frame 100. The annular rotating body 150 includes an inscribed gear 151 formed on its inner circumference, and pull blocks 152 and 153 formed opposite to each other.

[0029] The pull blocks 152 and 153 protrude outward from the annular rotating body 150 and may be either fixed to the annular rotating body 150 or incorporated into the annu-

lar rotating body 150.

[0030] A driving shaft 230 having a pinion 232, which interlocks with the inscribed gear 151, and a driving sprocket 231 is installed on the frame 100. The pinion 232 and the driving sprocket 231 are formed at one end of the driving shaft 230. The driving sprocket 231 is connected with a motor sprocket 210 of the driving motor 200 by using a chain 220, such that the driving shaft 230 can be rotated.

[0031] As shown in FIG. 4 and 9, a coupling portion to which the pull blocks 152 and 153 are coupled such as to be slipped in and out is formed on the hanger support plate 140. In the first embodiment of the present invention, the coupling portion is constituted with a pair of dogs 141 and 142, which are separated from each other by a distance corresponding to the width of each of the pull blocks 152 and 153 and protrude from the upper surface of the hanger support plate 140.

[0032] When the end of the pull block 152 or 153 enters between the dogs 141 and 142 of the hanger support plate 140, the annular rotating body 150 is rotated, and accordingly, the suspension chain 130 is circulated.

[0033] As shown in FIG. 12, the coupling portion may be constituted with a pair of pull rollers 143 and 144, which are

rotatably installed on the upper surface of the hanger support plate 140 at a distance corresponding to the width of each of the pull blocks 152 and 153. In this case, when the pull block 152 or 153 enters between the pull blocks 143 and 144, their entering can be smooth due to the rotation of the pull blocks 143 and 144, and noise generated by abrasion can be reduced.

[0034] Referring to FIGS. 4 through 7, a support unit for supporting the annular rotating body 150 such as to be rotated with respect to the frame 100 includes an annular fixing body 160, which is fixed to the frame 100 and has an inner circumference to which the annular rotating body 150 is rotatably coupled. The annular fixing body 160 and the annular rotating body 150 are coupled to each other using a bearing such as to be rotated.

[0035] Referring to FIGS. 10 and 11, the support unit may include a plurality of guide rollers 255, which are rotatably fixed to the frame 100 such as to be arranged in a circle, and an annular rib 254, which is formed on the edge of the inner circumference of the annular rotating body 250 and guided by the guide rollers 255. An inscribed gear 251 is formed on the inner circumference of the annular rotating body 250 and interlocks with the pinion 232. Reference

numerals 252 and 253 denote pull blocks.

[0036] Referring to FIGS. 6 and 9, in the suspension chain 130, link plates 131 in each pair are rotatably connected to each other by a link pin 132, with which a roller 135 is combined. The roller 135 keeps an interval between two link plates 131 and can move to guide ribs 111a and 112a of the chain guide rails 111 and 112.

[0037] In the suspension chain 130, one of the two link plates 131 in a pair is removed, and the hanger support plate 140 is positioned opposite to the remaining link plate 131. Hence, the hanger support plate 140 and the remaining link plate 131 form the suspension chain 130.

[0038] The vertical rotary parking system having such a structure operates as follows. First, as shown in FIG. 3, a vehicle is loaded on a hanger 120 that is located adjacent to the ground, and the driving motor 200 is driven. As shown in FIG. 6, the power of the driving motor 200 passes through the motor sprocket 21 and the driving sprocket 220 and rotates the driving shaft 230. At this time, the annular rotating body 150 is rotated with respect to the annular fixing body 160 by a rotation of the pinion 232. When the hanger support plate 140 of the suspension chain 130 enters on a path along which the pull blocks 152 and 153

rotate, the end of one of the pull blocks 152 and 153 enters between the dogs 141 and 142 of the hanger support 140 and attached to them. Hence, when the annular rotating body 150 rotates, the suspension chain 130 circulates in the direction of the rotation of the annular rotating body 150. As described above, the suspension chain 130 is circulated by the pulling of the pull blocks 152 and 153, and when the hanger support plate 140 departs from the path along which the pull blocks 152 and 153 rotates, the pull blocks 152 or 153 is detached from the dogs 141 and 142 of the hanger support plate 140. At this time, the other pull block 152 or 153 pull another hanger support plate 140. In this way, the suspension chain 130 continuously circulates.

[0039] While the suspension chain 130 is circulating, the roller 135 of the suspension chain 130 is guided to the guide ribs 111a and 112a of the chain guide rollers 111 and 112 so that stable circulation can be achieved.

[0040] In the above-described vertical rotary parking system according to the first embodiment of the present invention, the pinion 232 rotates while toughing internally the inscribed gear 151 of the annular rotating body 150. Hence, the vertical rotary parking system can decelerate without a

special deceleration device formed by a connection of a plurality of chains.

[0041] In the case where the annular rotating body 250 rotates while being supported by the plurality of guide rollers 255 as shown in FIGS. 10 and 11, the annular rotating body 160 used in the first embodiment is not required, leading to a cost saving.

[0042] Also, in the case where the pull rollers 143 and 144 are adopted to pull the pull blocks 152 and 153 onto the hanger support plate 140 as shown in FIG. 12, the pull blocks 152 and 153 can be smoothly pulled onto or out of the hanger support plate 140, and noise generated by abrasion is reduced.

[0043] While the present invention has been particularly shown and described with reference to exemplary embodiments thereof, it will be understood by those of ordinary skill in the art that various changes in form and details may be made therein without departing from the spirit and scope of the present invention as defined by the following claims.

[0044] Secondly, a pinion is inscribed by an annular rotating body and rotates the same. Thus, a driving unit for deceleration is simplified, and the driving efficiency is im-

proved. Also, the simple structure of the driving unit contributes to a vertical rotary parking system with a simple, beautiful appearance, and the costs for manufacturing and installing the vertical rotary parking system are reduced.

[0045] Thirdly, since pull rollers are used to pull the pull blocks onto the hanger support plate, noise generated while the pull blocks are slipping onto or out of hanger support plates is greatly reduced. Also, abrasion is reduced, thus extending the life span of the vertical rotary parking system.